

WHAT IS CLAIMED IS:

1 A binder for making an investment casting mold comprising a mixture of colloidal silicas, wherein the colloidal silicas have average particle size diameters of 4, 8 and 13 nanometers.

5 2. The binder of claim 1 wherein the 4 nanometer colloidal silica is present in the mixture in an amount of about 20% to about 70% by weight, the 8 nanometer colloidal silica is present in the mixture in an amount of about 10% to about 40% by weight and the 13 nanometer colloidal silica is present in the mixture in an amount of about 10% to about 40% by weight.

10 3. The binder of claim 1 wherein the 4 nanometer colloidal silica is present in the mixture in an amount of about 44% by weight, the 8 nanometer colloidal silica is present in the mixture in an amount of about 28% by weight and the 13 nanometer colloidal silica is present in the mixture in an amount of about 28% by weight.

15 4. The binder of claim 1 further comprising at least one polymer selected from the group consisting of latex polymers, water-soluble polymers and mixtures thereof.

5. The binder of claim 4 wherein the polymer is present at a concentration between about 0.25 and about 20 weight percent.

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6. A colloidal silica binder for making an investment casting mold comprising silica particles, wherein at least 30% of the particles have average diameters less than about 4 nm and a solids content greater than about 15%.

7. The colloidal silica binder of claim 6 wherein the average diameter of the silica particles is in the range of about 5.5nm to 8.5nm.

8. The colloidal silica binder of claim 6 wherein about 90% of the silica particles have average
5 diameters in the range of about 2nm to about 16nm.